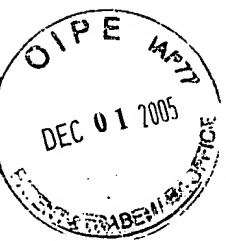


APPLICATION NO. 09/846,410

TITLE OF INVENTION: Multiple Data Rate Hybrid Walsh Codes for
CDMA

INVENTOR: Urbain A. von der Embse

Currently amended Claims



APPLICATION NO. 09/846.410

TITLE OF INVENTION: Multiple Data Rate ~~Complex~~ Hybrid Walsh Codes
for CDMA

5 INVENTORS: Urbain A. von der Embse

CLAIMS

10 WHAT IS CLAIMED IS:

Claim 1. (cancelled)

Claim 3. (cancelled)

Claim 3. (cancelled)

15 Claim 4. (cancelled)

Claim 5. (currently amended) A method to generate for the
~~design and implementation of fast encoders and fast decoders for~~
20 Hybrid Walsh and generalized Hybrid Walsh ~~complex orthogonal~~ CDMA
channelization codes for multiple data rate users, ~~over a~~
~~frequency band with properties~~ said method comprising:

means for generating orthogonal Hybrid Walsh inphase (real
25 axis) codes and quadrature (imaginary axis) codes are defined by
lexicographic reordering permutations of the Walsh code,

means for generating lexicographic permutations from the
~~Hybrid Walsh codes have a 1-to-1~~ sequency~frequency,
30 ~~correspondence with the DFT codes and have a 1 to 1 even~cosine,~~
and odd~sine correspondences with the DFT codes,

means for constructing Hybrid Walsh codes take with values
{1+j, -1+j, -1-j, 1-j} or equivalently take values {1, j, -1, -j}
with $j=\sqrt{-1}$, a (-45) rotation of axes and a renormalization

5 means for constructing generalized Hybrid Walsh orthogonal
and quasi-orthogonal codes can be constructed for a wide range of
code lengths by combining Hybrid Walsh, Walsh, with DFT (discrete
Fourier transform), Hadamard, and other orthogonal codes, and
quasi-orthogonal PN (pseudo noise), and the plurality of other
10 codes using tensor (Kronecker) product, direct product, and
functional combining,

fast encoding and fast decoding implementation algorithms
are defined

15 algorithms are defined to means for mapping multiple data
rate user data symbols onto the code input data symbol vector,
and for fast encoding and the inverses of these algorithms are
defined for recovery of the data symbols with fast decoding

20 means for performing fast encoding and decoding.

encoders perform complex multiply encoding of complex data
to replace the current Walsh real multiply encoding of inphase
25 and quadrature data

decoders perform complex conjugate transpose multiply
decoding of complex data to replace the current Walsh real
multiply decoding of inphase and quadrature data

30

5 Claim 6. (currently amended) A method to generate ~~for the~~
~~design and implementation of encoders and decoders for complex~~
~~orthogonal CDMA and generalized complex orthogonal CDMA~~
~~channelization codes for multiple data rate users over a~~
~~frequency band with properties~~ said method comprising:

10 means for generating orthogonal complex codes inphase (real
axis) codes and quadrature (imaginary axis) codes ~~are defined by~~
~~reordering permutations of the real Walsh codes,~~

15 means for constructing orthogonal and quasi-orthogonal
~~generalized complex codes can be constructed for a wide range of~~
~~code lengths by combining the complex codes with from DFT,~~
~~(discrete Fourier transform), Hybrid Walsh, Walsh, Hadamard, and~~
~~other orthogonal codes, and quasi-orthogonal PN, codes and the~~
20 plurality of other codes using tensor product, direct product,
and functional combining,

~~fast encoding and fast decoding implementation algorithms~~
~~are defined.~~

25 ~~algorithms are defined to~~ means for mapping multiple data
rate user data symbols onto the code input data symbol vector,
and ~~for fast encoding and the inverses of these algorithms are~~
~~defined for recovery of the data symbols with fast decoding~~

30 means for performing fast encoding and decoding.

~~encoders perform complex multiply encoding of complex data~~
~~to replace the current Walsh real multiply encoding of inphase~~
35 ~~and quadrature data~~

~~decoders perform complex conjugate transpose multiply
decoding of complex data to replace the current Walsh real
multiply decoding of inphase and quadrature data~~

APPLICATION NO. 09/846,410

TITLE OF INVENTION: Multiple Data Rate Hybrid Walsh Codes for
CDMA

INVENTOR: Urbain A. von der Embse

Clean version of how the Claims will read.

APPLICATION NO. 09/846.410

TITLE OF INVENTION: Multiple Data Rate Hybrid Walsh Codes
for CDMA

INVENTOR: Urbain A. von der Embse

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CLAIMS

WHAT IS CLAIMED IS:

10

Claim 1. (cancelled)

Claim 3. (cancelled)

Claim 3. (cancelled)

Claim 4. (cancelled)

15

Claim 5. (currently amended) A method to generate Hybrid Walsh and generalized Hybrid Walsh CDMA channelization codes for multiple data rate users, said method comprising:

20

means for generating orthogonal Hybrid Walsh inphase (real axis) codes and quadrature (imaginary axis) codes by lexicographic reordering permutations of the Walsh code,

means for generating lexicographic permutations from the 1-to-1 sequency~frequency, even~cosine, and odd~sine correspondences with the DFT codes,

25

means for constructing Hybrid Walsh codes with values $\{1+j, -1+j, -1-j, 1-j\}$ or equivalently $\{1, j, -1, -j\}$ with $j=\sqrt{-1}$,

30

means for constructing generalized Hybrid Walsh orthogonal and quasi-orthogonal codes by combining Hybrid Walsh, Walsh, DFT (discrete Fourier transform), Hadamard, quasi-orthogonal PN (pseudo noise), and the plurality of other codes using tensor (Kronecker) product, direct product, and functional combining,

means for mapping multiple data rate user data symbols onto the
code input data symbol vector, and

5 means for performing fast encoding and decoding.

Claim 6 (currently amended) A method to generate complex CDMA and
generalized complex CDMA channelization codes for multiple data
rate users, said method comprising:

10 means for generating orthogonal complex codes inphase (real axis)
codes and quadrature (imaginary axis) codes by reordering
permutations of the real Walsh codes,

means for constructing orthogonal and quasi-orthogonal

generalized complex codes from DFT, Hybrid Walsh, Walsh,
15 Hadamard, quasi-orthogonal PN, and the plurality of other
codes using tensor product, direct product, and functional
combining,

means for mapping multiple data rate user data symbols onto the
code input data symbol vector, and

20 means for performing fast encoding and decoding.

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